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During the Pleistocene period a thick mantle of glacial deposits was spread over the entire area, which has been eroded far enough to uncover the rocks here and there.

Clements's description of the western part of the district treats of the surface features, the economic resources and the petrographical character of the various formations, especial attention being paid to the volcanic rocks. The great abundance of volcanic breccias and tuffs indicates the probable existence in Huronian time of a volcanic cone in this region, but the possible location of its vent has not been discovered. A small part of the igneous rocks are acid, their area being too small to map on the scale of publication. They include rhyolite-porphyries and aporhyolite-porphyries and breccia of the latter. The great part of the volcanics are metabasalts and breccias of the same. An interesting development of ellipsoidal structure is noted. The pre-Cambrian intrusive rocks include granites and rhyolite-poryhyry, metadolerite, meta-basalt and picrite-porphyry, besides a series considered to be closely connected genetically ranging from granite, tonalite and quartz-mica-diorite through diorite, gabbro, and norite to peridotite. The diorite is closely related to monzonite.

In the second part of the monograph Smyth discusses at length the effect of buried magnetic ores on the magnetic dip needle, describes its use and the results of careful observations in locating the iron-bearing deposits. He also describes the different formations structurally and petrographically. The same is done by Bayley for the Sturgeon River Tongue.

J. P. I.

The Geography of Chicago and its Environs. By Rollin D. Salisbury and William C. Alden. Bulletin No. 1 of the Geographic Society of Chicago, published by the Society. Chicago, 1899. 64 pp.

This pamphlet is a model essay on local geography written in an interesting style and illustrated in an attractive and instructive manner. From the maps and descriptions it is learned that Chicago is situated on a plain which stretches from Winnetka, sixteen miles north, to Dyer, about twenty-eight miles south of Chicago, and sweeps eastward around the southern end of Lake Michigan. This plain is narrower at its extremities and has a maximum width of fifteen miles in about the latitude of Chicago; it is limited on the east and northeast by Lake

Michigan, on the west and southwest generally by the Valparaiso moraine which loops around the southern end of Lake Michigan, through northern Indiana into Michigan. The plain topography is varied by three prominent "islands:" Stony Island, a drift-covered, dome-shaped hill of Niagara limestone with quaquaversal dip; Blue Island, a single morainic ridge about six miles long and fifty feet above its surroundings; and Mt. Forest Island, a portion of the Valparaiso moraine about 120 feet higher than the plain, separated from the rest of this moraine by the Chicago outlet. The plain is continued through the Valparaiso moraine southwest of Chicago by the Chicago outlet, which is divided by Mt. Forest Island into the Sag outlet and the Des Plaines outlet. The Des Plaines outlet is now followed by the Chicago Drainage Canal. Several less conspicuous gravel and sand beach ridges converging toward the Chicago outlet from the northeast and southeast help to break the monotony of the plain. On these ridges are oak groves, which have apparently suggested the names for the towns Oak Park, Oak Lawn, Englewood and others. The eastern third of the plain is largely made of gravel and sand. With the exception of the beach ridges, the western two thirds is largely of till. These deposits vary in depth from 0 to 130 feet. The country rock is Niagara limestone which has an elevation varying from 124 feet below the lake level to about 20 feet above it in Stony Island, and 100 to 110 feet above it under the Valparaiso moraine. The southeastern edge of the plain is occupied by a series of small lakes, the basins of which are in large part made by enclosing beach ridges. At the south end of Lake Michigan there are sand dunes with a maximum height of 100 to 200 feet. Other smaller dune areas exist nearer the city.

The main recorded events in the geographical history of the region since Devonian times are: (1) Withdrawal of the sea and destruction of formations younger than the Niagara with the exception of some fossiliferous Devonian material preserved in joints of the Niagara formation; (2) invasion of the ice in the glacial period, rounding off the angularities of the rock surface and probably diminishing the relief of the region by deposits of drift. At a late stage of the ice invasion the Valparaiso moraine was made. (3) As the ice edge retreated from the Valparaiso moraine a lake accumulated in the depression between the ice front and the moraine until the water stood at an elevation sixty feet above the present Lake Michigan when it overflowed to the west through the valley of the Des Plaines River and through the Sag outlet. To this lake Mr. Leverett has given the name Lake Chicago. The stages in the history of this lake are as follows:

(*a*) Glenwood stage, the highest stage, when the level was sixty feet higher than Lake Michigan is now. During this stage the outlet was cut down twenty feet.

(*b*) A stage of recession, when discharge through the Chicago outlet ceased and the water withdrew from the Chicago plain in part or entirely. During this stage deposits of peat accumulated.

(*c*) Calumet stage, in which the water again discharged through the Chicago outlet at a level forty feet higher than the present level of Lake Michigan. During this stage the Calumet beach was formed over the peat deposits of the preceding stage.

(*d*) The lowering of the outlet gradually reduced the level of the lake twenty feet when the Tolleston beach was formed.

(*e*) A lower outlet was opened to the north and the lake fell below the level of the Chicago outlet. This closed the history of Lake Chicago and inaugurated that of Lake Michigan. Between the Tolleston beach and the shore of Lake Michigan there is an extensive series of sand and gravel ridges among which lie the small lakes mentioned above.

Abundant evidence of fresh water life has been found in the deposits of the Tolleston stage of the lake, but not in the deposits of earlier stages. On the surface of the Calumet beach, however, marine shells of southern species have been found, which may have been introduced artificially.

The bulletin is essentially a popularized version of the work of the United States Geological Survey and is a tribute to the value of its investigations. It is to be hoped that this bulletin will stimulate the publication of similar essays on local geography elsewhere. Interest in geography is certainly increased by such publications.

CHARLES EMERSON PEET.